

WHAT IS CLAIMED IS:

(1) Radio communication system comprising;

a plurality of radio stations,

each radio station managing at least one radio channel for packet radio communication,

each radio station communicating with another radio station either directly or through at least one other radio station,

each radio station communicating with adjacent radio station in one of centralized control access phase and distributed control access phase for each radio channel,

in centralized control access phase, each radio station operating adaptively either as a master station which controls transmission right and transmits a signal according to control of the own radio station or as a slave station which transmits a signal under control of a master station, for each channel, and

said centralized control access phase and said distributed control access phase being switched on

time divisional basis for each radio station and for each radio channel.

(2) Radio communication system according to claim 1, wherein when a radio station  $A_1$  transmits a signal to another radio station  $A_n$  through radio stations  $A_2, A_3, \dots, A_k, A_{k+1}, \dots, A_{n-1}$  ( $k$  is an integer larger than 2 and equal to or smaller than  $n-1$ ), a radio station  $A_k$  communicates with a radio station  $A_{k+1}$  through a radio channel between stations  $A_k$  and  $A_{k+1}$  having relation of a master station and a slave station, or a radio channel between slave stations  $A_k$  and  $A_{k+1}$  controlled by a common master station.

(3) Radio communication system according to claim 1, wherein when a radio station operates in a radio channel as a master station, said radio station transmits a beacon packet including an address of said master station, an address of all the slave stations belonging to said master station and time until each slave station should transmit a request packet to said master station responsive to said beacon packet, for

indicating beginning of centralized control access phase, and each slave station, upon receipt of said beacon packet, transmits said request packet to said master station at a time instructed by said beacon packet.

(4) Radio communication system according to claim 3, wherein a pair of radio stations operating under relation of a master station and a slave station finish centralized control access phase and switch to distributed control access phase, said master station transmits a contention free end packet indicating end of centralized control access phase, said contention free end packet includes end time of said centralized control access phase, time until next beacon packet is transmitted, and instruction whether a slave station receiving said contention free end packet should relay said contention free end packet to another slave station, and a slave station which receives said contention free end packet transmits the other contention free end packet to said master station at a time indicated by said contention free

end packet sent by the master station, so that centralized control access phase switches to distributed control access phase.

(5) Radio communication system according to claim 1, wherein each radio station performs carrier sense for a predetermined time for each channel,

when said radio station receives a beacon packet from a master station in a specific radio channel, said radio station operates as a slave station belonging to said master station in said radio channel,

when said radio station does not receive a beacon packet from a master station but receives a request packet from a slave station in a specific radio channel, said radio station operates as a silent station which is prohibited to transmit a signal during said master station operates in centralized control access phase in said radio channel, and afterwards when said radio station receives a contention free end packet from a master station or a slave station, said radio station operates in distributed control access phase until a time of next beacon packet indicated in said

contention free end packet, and

when said radio station receives no beacon packet from a master station and no request packet, said radio station operates as a master station in said channel in centralized control access phase.

(6) Radio communication system according to claim 5, wherein when a first radio station receives no beacon packet from a master station, and no request packet,

said radio station selects second radio station which is connected to said radio station in another specific radio channel,

said first radio station operates as a master station in said specific radio channel and said second radio station operates as a slave station belonging to said master station, or said second radio station operates as a master station and said first radio station operates as a slave station belonging to said master station.

(7) A radio station apparatus in a radio network comprising a plurality of radio stations, comprising;

each radio station apparatus having at least a radio channel for radio communication,

each radio station apparatus being able to operate as one of a master station having transmission control right in centralized control access phase, a slave station controlled by a master station, a silent station, and distributed control access phase.

(8) A method for radio communication in a plurality of radio stations, each radio station having at least one radio channel for packet radio communication, each radio station communicating with another radio station either directly or through at least one other radio station, each radio station communicating with adjacent radio station in one of centralized control access phase and distributed control access phase for each radio channel, in case of centralized control access phase, each radio station operating adaptively either as a master station which controls transmission right and transmits a signal according to control of the own radio station or as a slave station which transmits a signal under control of a master station,

for each channel, and said centralized control access phase and said distributed control access phase being switched on time divisional basis for each radio station and for each radio channel.

(9) A method for radio communication according to claim 8, wherein when a radio station  $A_1$  transmits a signal to another radio station  $A_n$  through radio stations  $A_2, A_3, \dots, A_k, A_{k+1}, \dots, A_{n-1}$  ( $k$  is an integer larger than 2 and equal to or smaller than  $n-1$ ), a radio station  $A_k$  communicates with a radio station  $A_{k+1}$  through a radio channel between stations  $A_k$  and  $A_{k+1}$  having relation of a master station and a slave station, or a radio channel between slave stations  $A_k$  and  $A_{k+1}$  controlled by a common master station.

(10) A method for radio communication according to claim 8, wherein when a radio station operates in a radio channel as a master station, said radio station transmits a beacon packet including an address of said master station, an address of all the slave stations

belonging to said master station and time until each slave station should transmit a request packet to said master station responsive to said beacon packet, for indicating beginning of centralized control access phase, and each slave station, upon receipt of said beacon packet, transmits said request packet to said master station at a time instructed by said beacon packet.

(11) A method for radio communication according to claim 10, wherein a pair of radio stations operating under relation of a master station and a slave station finish centralized control access phase and switch to distributed control access phase, said master station transmits a contention free end packet indicating end of centralized control access phase, said contention free end packet includes end time of said centralized control access phase, time until next beacon packet is transmitted, and instruction whether a slave station receiving said contention free end packet should relay said contention free end packet to another slave station, and a slave station which



receives said contention free end packet transmits the other contention free end packet to said master station at a time indicated by said contention free end packet sent by the master station, so that centralized control access phase switches to distributed control access phase.

(12) A method for radio communication according to claim 8, wherein each radio station performs carrier sense for a predetermined time for each channel,

when said radio station receives a beacon packet from a master station in a specific radio channel, said radio station operates as a slave station belonging to said master station in said radio channel,

when said radio station does not receive a beacon packet from a master station but receives a request packet from a slave station in a specific radio channel, said radio station operates as a silent station which is prohibited to transmit a signal during said master station operates in centralized control access phase in said radio channel, and afterwards when said radio station receives a contention free end packet from a

master station or a slave station, said radio station operates in distributed control access phase until a time of next beacon packet indicated in said contention free end packet, and

when said radio station receives no beacon packet from a master station and no request packet, said radio station operates as a master station in said channel in centralized control access phase.

(13) A method for radio communication according to claim 12, wherein when a first radio station receives no beacon packet from a master station, and no request packet,

said radio station selects second radio station which is connected to said radio station in another specific radio channel,

said first radio station operates as a master station in said specific radio channel and said second radio station operates as a slave station belonging to said master station, or said second radio station operates as a master station and said first radio station operates as a slave station belonging to said

master station.